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Building & Highway Material Testing Laboratory
An ISO 9001:2008 Certified Company
NABL - Accredited Laboratory as per ISO / IEC-17025 : 2005

Job No.: CTCE/BBMP/KRIDL/W.No.01/WMM/Gradation/2014-15 : 02.07.2015

GRADATION FOR WMM
MORTH TABLE-400-11

Customer : **Asst. Executive Engineer,** Yelahanka Sub Division, BBMP, Bangalore.

Agency : **Technical Manager,** KRIDL, Bangalore.

Name of Work : Improvements to Roads and Construction at Vikasa Layout in Ward No.01 of Yelahanka Sub Division, Bangalore.

Reference : AEE/BBMP/YSD/AE-1/2014-15/314 Dated: 20.03.2015

Date of Testing : 02.07.2015

Material : WMM

Sample Location : WMM Mix Plant Oven Dry Wt (gm): **5000**

Is Sieve Size in mm	Weight Retained (gm)	Cumulative Weight Retained (gm)	Cumulative % of Retained	Cumulative % of Passing	Spec.Limits
53	0	0	0	100	100
45	85	85	1.7	98.3	95-100
22.4	1560	1645	32.9	67.1	60-80
11.2	890	2535	50.7	49.3	40-60
4.75	800	3335	66.7	33.3	25-40
2.36	685	4020	80.4	19.6	15-30
0.600	450	4470	89.4	10.6	8-22
0.075	400	4870	97.4	2.6	0-8

Note:

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Job No.: CTCE/BBMP/KRIDL/W.No.01/WMM/AIV/2014-15 02.07.2015

Aggregate Impact Value

IS: 2386 Part IV

Customer	**Asst. Executive Engineer,** Yelahanka Sub Division, BBMP, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of the Work	Improvements to Roads and Construction at Vikasa Layout in Ward No.01 of Yelahanka Sub Division, Bangalore.
Reference	AEE/BBMP/YSD/AE-1/2014-15/314 Dated: 20.03.2015
Source / Location	WMM Plant
Type of Mix	Wet Mix macadam
Date of Testing	02.07.2015

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	382	385	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	78	79	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	304	306	
4	Aggregate Impact value = percent fines	20.42	20.52	
	100* (W_2/W_1)%			20.89

Comments:

→ Maximum allowable Aggregate Impact value for Wet mix Macadam is 30%

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Job No.: CTCE/BBMP/KRIDL/W.No.01/WMM/S-T/2014-15 02.07.2015

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	**Asst. Executive Engineer,** Yelahanka Sub Division, BBMP, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of Work	Improvements to Roads and Construction at Vikasa Layout in Ward No.01 of Yelahanka Sub Division, Bangalore.
Reference	AEE/BBMP/YSD/AE-1/2014-15/314 Dated: 20.03.2015
Technical Reference	IS 2386(Part 1) 1963 (RA 2011)
Type of Mix	Wet Mix Macadam
Date of Testing	02.07.2015

Result : Flakiness Index = **11.23%**

Elongation Index = **13.25%**

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Result : Combined Flakiness & Elongation index 24.48%

Comments:

Maximum allowable Flakiness & Elongation Index for Wet Mix Macadam is 30%

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Job No.: CTCE/BBMP/KRIDL/W.No.01/CSR-03/794J/QB(SDBC)/2014-15 20.07.2015

TEST REPORT ON DETERMINATION OF BITUMEN CHARACTERISTICS

*CUSTOMER	:	**Asst. Executive Engineer,** Yelahanka Sub Division, BDA, Bangalore.
*AGENCY	:	**Technical Manager,** KRIDL, Bangalore.
*NAME OF THE WORK	:	Improvements to Roads and Construction at Vikasa Layout in Ward No.01 of Yelahanka Sub Division, Bangalore.
REFERENCE	:	AEE/BBMP/YSD/AE-1/2014-15/314 Dated: 20.03.2015
*SAMPLE ID	:	Bitumen
DATE OF SAMPLING	:	18.07.2015
DATE OF TESTING	:	20.07.2015

The results of the tests conducted on the bitumen sample.

Sl. No	Description	Test Method as per IS	Test Result	Requirement as per IS:73:2013
1	Penetration at 25 °C, 1/10 mm	IS :1203 -1978 (RA-2009)	84	80 to 100
2	Softening point, °C	IS :1205 -1978 (RA-2009)	44	Min. 40
3	Ductility at 27°C, cm	IS :1208 -1978 (RA-2009)	100 >	Min. 75
4	Flash Point, °C	IS :1209 -1978 (RA-2009)	298	Min. 220

*Information is furnished by the Customer/Representative.

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Job No.: CTCE/BBMP/KRIDL/W.No.01/SDBC/AIV/2014-15

20.07.2015

Aggregate Impact Value

IS: 2386 Part IV

Customer	**Asst. Executive Engineer,** Yelahanka Sub Division, BDA, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of the Work	Improvements to Roads and Construction at Vikasa Layout in Ward No.01 of Yelahanka Sub Division, Bangalore.
Reference	AEE/BBMP/YSD/AE-1/2014-15/314 Dated: 20.03.2015
Source / Location	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	20.07.2015

Sl No.	Details	Trial No. 1	Trial No. 2	Average
1	Total weight of aggregate sample filling the cylindrical measure = W_1 g	388	389	
2	Weight of agregate passing 2.36 mm sieve after the test = W_2 g	85	86	
3	Weight of aggregate retained 2.36 mm sieve after the test = W_3 g	303	303	
4	Aggregate Impact value = percent fines 100* (W_2/W_1)%	21.91	22.11	22.01

Comments:

→ Maximum allowable Aggregate Impact value for Semi Dense Bituminous Concrete is 27%

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Job No.: CTCE/BBMP/KRIDL/W.No.01/SDBC/Shape_T/2014-15 : 20.07.2015

DETERMINATION OF FLAKINESS INDEX & ELONGATION INDEX OF COARSE AGGREGATES

Customer	: **Asst. Executive Engineer,** Yelahanka Sub Division, BDA, Bangalore.
Agency	: **Technical Manager,** KRIDL, Bangalore.
Name of Work	: Improvements to Roads and Construction at Vikasa Layout in Ward No.01 of Yelahanka Sub Division, Bangalore.
Reference	: AEE/BBMP/YSD/AE-1/2014-15/314 Dated: 20.03.2015
Technical Reference	: IS 2386(Part 1) 1963 (RA 2007)
Type of Mix	: Semi Dense Bituminous Concrete
Date of Testing	: 20.07.2015

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Result : Flakiness Index = **11.52%**

Elongation Index = **13.23%**

Result : Combined Flakiness & Elongation index **24.75%**

Comments:

Maximum allowable Flakiness & Elongation Index for Semi Dense Bituminous Concrete is 30%

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Job No.: CTCE/BBMP/KRIDL/W.No.01/SDBC/Stripping/2014-15 22.07.2015

Stripping Value of Road Aggregates (Static Immersion Test)

IS: 6241

Customer	**Asst. Executive Engineer,** Yelahanka Sub Division, BDA, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of the work	Improvements to Roads and Construction at Vikasa Layout in Ward No.01 of Yelahanka Sub Division, Bangalore.
Reference	AEE/BBMP/YSD/AE-1/2014-15/314 Dated: 20.03.2015
Type of Mix	Semi Dense Bituminous Concrete
Date of Testing	22.07.2015

Type of binder : 80/100
Percentage of binder used : 5.0% by wt.
Total weight of aggregate : 200 g
Total weight of binder : 10.0 g
Temperature of water-bath : 40° C

Observation Number	Stripping, Percentage	Average, Percentage	Average Retained Coating, %
1	3.1	3.20	96.80
2	3.2		
3	3.3		

Comments:
→ Minimum allowable Aggregate retained coating for Semi Dense Bituminous Concrete is 95%

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Job No.: CTCE/BBMP/KRIDL/W.No.01/SDBC/Sp_Wa/2014-15 22.07.2015

Specific Gravity And Water Absorption Test

IS: 2386 Part III

Customer	**Asst. Executive Engineer,** Yelahanka Sub Division, BDA, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of the Work	Improvements to Roads and Construction at Vikasa Layout in Ward No.01 of Yelahanka Sub Division, Bangalore.
Reference	AEE/BBMP/YSD/AE-1/2014-15/314 Dated: 20.03.2015
Type of Mix	Semi Dense Bituminous Concrete
Source / Location	Hotmix Plant, Bangalore
Date of Testing	22.07.2015

Sl. No.	Details	Notation	Test Number			Mean Value
			Test 1	Test 2	Test 3	
1	Weight of aggregate suspended in water with the basket	W_1 g	2008	2009	2010	
2	Weight of basket suspended in water	W_2 g	755	755	755	
3	Weight of saturated aggregate in water	$(W_1 - W_2) = W_s$ g	1253	1254	1255	
4	Weight of saturated surface dry aggregate in air	W_3 g	2015	2013	2014	
5	Weight of water equal to the volume of the aggregate	$(W_3 - W_S)$ g	762	759	759	
6	Weight of oven dried aggregate	W_4 g	2005	2004	2003	
7	Specific Gravity	$W_4/(W_3-W_S)$	2.631	2.640	2.639	2.637
8	Apparent Specific gravity	$W_4/(W_4-W_S)$	2.666	2.672	2.678	2.672
9	Water Absorption	$((W_3-W_4)*100)/W_4$	0.50%	0.45%	0.55%	0.50%

Comments:

→ Maximum allowable Aggregate Water absorption value for Semi Dense Bituminous Concrete is 2.0%

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Job No.: CTCE/BBMP/KRIDL/W.No.01/SDBC/AGG/2014-15 22.07.2015

Aggregate Gradation Test

IS : 2386 Part I

Customer	**Asst. Executive Engineer,** Yelahanka Sub Division, BDA, Bangalore.
Agency	**Technical Manager,** KRIDL, Bangalore.
Name of the Work	Improvements to Roads and Construction at Vikasa Layout in Ward No.01 of Yelahanka Sub Division, Bangalore.
Reference	AEE/BBMP/YSD/AE-1/2014-15/314 Dated: 20.03.2015
Sample I / D	Hot Mix Plant, Bangalore
Type of Mix	Semi Dense Bituminous Concrete (SDBC)
Date of Testing	22.07.2015

Total Weight of Sample: **5200** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade-II MORTH specification
9.5	290	5.6	5.58	94.42	90-100	
4.75	2580	49.6	55.19	44.81	35-51	
2.36	705	13.6	68.75	31.25	24-39	
1.18	625	12.0	80.77	19.23	15-30	
0.3	335	6.4	87.21	12.79	9-19	
0.075	330	6.3	93.56	6.44	3-8	

Total Weight of Sample: **5250** gm

SIEVE SIZE, mm	Weight Retained, gm	% Retained	Cummulative % Retained	% Passing	Grade-II As per MORTH	Remarks
13.2	0	0.0	0	100	100	Gradation satisfies Grade-II MORTH specification
9.5	290	5.5	5.52	94.48	90-100	
4.75	2950	56.2	61.71	38.29	35-51	
2.36	585	11.1	72.86	27.14	24-39	
1.18	420	8.0	80.86	19.14	15-30	
0.3	300	5.7	86.57	13.43	9-19	
0.075	355	6.8	93.33	6.67	3-8	

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Job No.: CTCE/BBMP/KRIDL/W.No.01/SDBC/Stability/2014-15 22.07.2015

TEST REPORT ON STABILITY OF MIX

Customer	:	**Asst. Executive Engineer,** Yelahanka Sub Division, BDA, Bangalore.
Agency	:	**Technical Manager,** KRIDL, Bangalore.
Name of the Work	:	Improvements to Roads and Construction at Vikasa Layout in Ward No.01 of Yelahanka Sub Division, Bangalore.
Reference	:	AEE/BBMP/YSD/AE-1/2014-15/314 Dated: 20.03.2015
Source of location	:	Hot mix Plant, Bangalore
Type of Mix	:	Semi Dense Bituminous Concrete
Date of Testing	:	22.07.2015

The results of the tests conducted on the Semi Dense Bituminous Concrete mix sample are as follows:

Sl. No	Description	Test Result 1	Test Result 2	Requirement as per MORTH (Table 500-16)
1	Marshal Stability, Kn	8.40	8.55	8.2 Kn (min)
2	Marshal flow, mm	2.95	3.20	2 – 4
3	Percent air voids in Mineral Aggregate	3.45	3.80	3 – 5
4	Voids in Compacted Mix	13.30	13.95	13 – 15
5	Percent Voids filled with Bitumen	66.50	67.80	65 - 78
6	Density, g/cc	2.27	2.28	--

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